IN THE CLAIMS:

1. (Original) A supersonic kinetic spray nozzle comprising:

a converging region and a diverging region separated by a throat;

at least a portion of said diverging region adjacent said throat having a cross-sectional expansion rate of at least 1.0 millimeters squared per millimeter.

2. (Original) The nozzle recited in claim 1, wherein said expansion rate is at least 2.5 millimeters squared per millimeter.

3. (Original) The nozzle recited in claim 1, wherein said expansion rate is at least 5.0 millimeters squared per millimeter.

4. (Original) The nozzle recited in claim 1, wherein said expansion rate is at least 10.0 millimeters squared per millimeter.

5. (Original) The nozzle recited in claim 1, wherein said portion comprises up to one third of a length of said diverging region.

6. (Original) The nozzle recited in claim 1, wherein said portion is located within a first one third of a length of said diverging region adjacent to said throat.

7. (Original) A kinetic spray system comprising:

a supersonic nozzle having a converging region and a diverging region separated by a throat; at least a portion of said diverging region adjacent said throat having a cross-sectional expansion rate of at least 1.0 millimeters squared per millimeter;

at least one powder injector connected to said nozzle with one of a low pressure or a high pressure powder feeder connected to said injector; and

a high pressure source of a heated main gas connected to said nozzle.

8. (Original) The kinetic spray system recited in claim 7, wherein said expansion rate is at least 2.5 millimeters squared per millimeter.

9. (Original) The kinetic spray system recited in claim 7, wherein said expansion rate is at least 5.0 millimeters squared per millimeter.

10. (Original) The kinetic spray system recited in claim 7, wherein said expansion rate is at least 10.0 millimeters squared per millimeter.

11. (Original) The kinetic spray system recited in claim 7, wherein said portion comprises up to one third of a length of said diverging region.

12. (Original) The kinetic spray system recited in claim 7, wherein said portion is located within a first one third of a length of said diverging region adjacent to said throat.

13. (Original) A method of kinetic spray coating a substrate comprising the steps of:

a) providing particles of a material to be sprayed;

b) providing a supersonic nozzle having a throat located between a converging region and a diverging region at least a portion of said diverging region adjacent said throat having a cross-sectional expansion rate of at least 1.0 millimeters squared per millimeter;

c) directing a flow of a gas through the nozzle, the gas having a temperature insufficient to cause melting of the particles in the nozzle; and

d) entraining the particles in the flow of the gas and accelerating the particles to a velocity sufficient to result in adherence of the particles on a substrate positioned opposite the nozzle.

14. (Original) The method of claim 13, wherein step b) comprises providing a diverging region having at least a portion with a cross-sectional expansion rate of at least 2.5 millimeters squared per millimeter.

15. (Original) The method of claim 13, wherein step b) comprises providing a diverging region having at least a portion with a cross-sectional expansion rate of at least 5.0 millimeters squared per millimeter.

16. (Original) The method of claim 13, wherein step b) comprises providing a diverging region having at least a portion with a cross-sectional expansion rate of at least 10.0 millimeters squared per millimeter.

17. (Original) The method of claim 13, wherein step b) comprises providing the portion within the first one third of the length of the diverging region adjacent to the throat.

18. (Original) The method of claim 13, wherein step b) comprises providing up to one third of the length of the diverging region as the portion having a cross-sectional expansion rate of at least 1.0 millimeters squared per millimeter.

19. (Original) The method of claim 13, wherein step a) comprises providing particles having an average nominal diameter of from 60 to 250 microns.

20. (Original) The method of claim 13, wherein step d) comprises accelerating the particles to a velocity of from 300 to 1300 meters per second.